

FURMAN

**MS Series
Confidence Monitoring System**

Owner's Manual

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Introduction

Thank you for purchasing a **Furman MS Series “Confidence” Monitor System**. We are confident you will be pleased with the confidence your MS Series monitor will give you about your audio and video signals! Under normal operating conditions, this product will provide reliable, long-term performance without maintenance.

A manufacturer of quality professional audio, video, and AC power products for over a quarter century, Furman stands behind the MS Series with a Three Year Limited Warranty and a firm commitment to customer satisfaction. Knowledgeable technicians and sales staff are available to answer questions about this or any other Furman product quickly and directly via telephone, fax, or e-mail. We are ready to provide you with quality service and applications assistance whenever you need it.

Contents

Each MS Series Monitor System includes: (1) MS Series unit; (1) instruction manual; (1) power supply; (1) warranty card. If any items are missing, please notify your dealer.

Description

There are at present six models in the MS Series. This manual describes them all, so there may be sections which do not apply to your particular unit. The various models differ primarily in the types and number of signals they can monitor: from 2 to 4 analog or digital audio channels, and one video channel. The six models are:

MS2A-1	2 Channel, Analog Audio
MS2AD-1	2 Channel, Analog/Digital Audio
MS4A-1	4 Channel, Analog Audio
MS4AD-1	4 Channel, Analog/Digital Audio
MS2AV-1	2 Channel, Analog Audio, Video
MS2ADV-1	2 Channel, Analog/Digital Audio, Video

All models share many basic features and capabilities, such as: full range shielded stereo speakers with **SPEAKER MUTE** switch; slide-style **VOLUME** control; **PHASE** indicator (mono-compatibility); front panel VU/PPM **BALLISTICS** selector; full 14 segment meters with **DIMMER**; **HEADPHONE** jack; XLR balanced inputs and outputs, each with a **SIGNAL** activity indicator; output **GAIN TRIM**; a UL/CE-approved external power supply; and a clean, modular design with minimal cabling, all in a compact, single rack space chassis.

Models with digital monitoring capability also include an **A/D SELECT** button and front and rear digital **SIGNAL** indicators. Video models include an LCD video monitor with associated **COLOR**, **TINT**, **CONTRAST**, and **BRIGHTNESS** controls, which automatically senses and displays NTSC and PAL signals. Four channel models include **LEFT** and **RIGHT CHANNEL SELECTOR** switches to assign any input to the left and right analog outputs. Non-video units feature a **BALANCE** slider to adjust the left/right position of the stereo image.

Because the speakers in the MS Series are magnetically shielded, no special consideration is required for installation in critical locations near video monitors.

Setup and Guided Tour

Operation of the MS Series is basic and straightforward. The controls and operation are mostly intuitive and self-explanatory, but are discussed here in detail to allow any user to operate it successfully.

Install the unit in its rack and connect the external power supply to the 5-pin DIN **DC POWER INPUT** connector on the rear panel. Connect an appropriate line cord to the power input on the supply box, and to the AC mains. The power supply accepts any input voltage from 100 to 240 VAC.

Analog Audio Monitoring

Connect active analog audio sources to each of the balanced XLR inputs on the rear panel. (Please refer to Figures 1-4 on page 9 for the locations of controls and indicators.) When the unit is powered up and audio above -28 dBu is present, the **SIG** (Signal) LEDs next to each input and output connector should flash. If you have a unit with digital capability, set the **A/D SELECT** button to ANALOG.

Next, vary the **VOLUME** and **BALANCE** sliders (**BALANCE** is present in non-video units only) to confirm that they affect the speakers and headphones identically. The **BALANCE** slider should move the stereo image from full left to full right. The headphones DO NOT disable the speakers when they are inserted into the **HEADPHONE** jack. Headphone monitoring is intended to minimize the distracting effects of surrounding ambient sound for the operator. *The speakers are still active when the headphones are plugged in to provide audio to others in the immediate area for confidence, while the operator is monitoring the audio specifically.* Nevertheless, the speakers can be muted if desired by pressing the **SPEAKER MUTE** button. An indicator LED lights when the speakers are muted. The **SPEAKER MUTE** button does not affect the headphones.

With audio input, the Level Meters will vary according to the **BALLISTICS** selected, either **VU** or **PPM**. Note that there is a **PK** (Peak) LED that will illuminate when the audio level exceeds +4 dBu. The movement of the meters is from -40 dBu to +3 dBu, left to right as is seen in analog metering. The zero reference of the meters may be set to either +4 dBu or +8 dBu with the **REF/dBu** button. Successive presses of the button will toggle between the two references. An indicator LED glows above the selected reference, which affects all meters on the unit.

NOTE: Choose VU for a slower, time-averaged meter response. Choose PPM for an extremely fast response which displays all peaks.

The brightness of the Level Meters' LED displays can be varied by the **DIMMER** control at the very left side of the front panel assembly. This control will vary the brightness from "Full On" to slightly visible. The Level Meters *cannot be dimmed completely* as this may cause an erroneous reading by operators not aware of the dimmed setting. This adjustment requires a small flat-blade screwdriver and has a travel of 270 degrees of rotation.

When normal, in-phase stereo signals are applied to the MS Series unit, the **PHASE** indicator will glow green, with an occasional yellow flicker. If one channel is disconnected or reduced to zero, the color will change to steady red. It will also be mainly red for out-of-phase stereo.

NOTE: Out-of phase stereo is not compatible with conversion to mono. The out-of-phase condition should be corrected, or there may be substantial level loss when left and right are summed to mono.

Digital Audio Monitoring

On MS Series units equipped for digital audio, stereo digital signal(s) may be connected via the rear panel BNC connector(s) labeled **AES1**, and, if present, **AES2**. Only one connector is needed per stereo signal. The digital input(s) conform to the *AES/EBU 75 ohm/BNC (AES-3id-1995)* standard. Another standard, *S/PDIF 75 ohm coaxial*, may also be monitored.

There are two Signal Present indicators for each BNC digital input. The indicator(s) on the rear panel are adjacent to the BNC connector(s) and are labeled **SIG**. The indicator(s) on the front panel are labeled **AES1** (and **AES2**). Both front and rear indicators display identically. If the digital data is valid and signal is present, they will glow GREEN. If the data is bad or no signal is present, they will glow RED.

Both analog and digital signals may be connected simultaneously. The meters, speakers, phase indicator, and headphone output will monitor the source selected with the **A/D SELECT** button, which toggles between ANALOG and DIGITAL, with indicator LEDs showing the chosen source.

Analog Outputs

The XLR balanced Analog Outputs on a MS Series unit need not be used. However, they provide a convenient, high quality balanced signal source, complete with their own **SIG** indicators to verify the presence of signal. There is also a stereo **GAIN TRIM** control on the rear panel which may be varied from -6 to +6 dB. Center rotation is 0 dB (unity gain).

The Analog Outputs are labeled Left and Right. With two-channel models, Channel 1 is assigned to the Left out and Channel 2 is assigned to the Right output. With four-channel models, output assignment switches (**LEFT CHANNEL SELECTOR** and **RIGHT CHANNEL SELECTOR**) are provided for maximum flexibility. They allow any channel to be routed to either output. Indicator LED's show which channel is selected by each switch.

NOTE: *In four-channel models, the **HEADPHONE** out, the internal speakers, and the **PHASE** indicator all monitor the two input channels that are assigned to the outputs.*

When a stereo digital source is being monitored, the analog version of that signal will appear at the Analog Outputs, allowing the MS Series unit to be used as a D/A converter.

Normally, in the factory-preset condition, the **VOLUME** and **BALANCE** controls do not affect the Analog Outputs (only the **GAIN TRIM** control affects the levels). However, if desired, the unit may be configured so that the Analog Outputs *do* follow the **VOLUME** and **BALANCE** controls. To do this, disconnect the unit from power, remove the screws securing the top cover, and locate positions J30 and J31 on the circuit board. A "suitcase" jumper plug should link Pins 1 and 2. Lift up the jumpers and reposition them so that they link Pins 2 and 3 instead. Replace the top cover. The outputs will now reflect the **VOLUME** and **BALANCE** settings.

Video Monitoring

If the MS Series unit is equipped for video monitoring, either NTSC or PAL signals may be connected to the rear panel BNC connector. The unit will automatically sense which standard is used and will display correctly. Verify that the expected video image is present and that **COLOR**, **TINT**, **BRIGHTNESS**, and **CONTRAST** are set for the planned viewing area.

System Verification

The procedure below is the same Final Test performed on MS Series units at the factory. Assuming there has been no apparent damage in shipment, it is not necessary to repeat it. However, it may be desirable to perform it as an initial confirmation of proper operation, as a periodic performance check, or whenever there is doubt about the unit's operation.

Initial Setup

The following is done with NO audio or video input to the rear panel connectors.

1. Set the **VOLUME** slider to mid position.
2. Plug External Supply into rear of chassis and corresponding AC outlet.
3. Verify that the **BALLISTICS** LED indicator is set to the VU setting.
4. Verify that the **SPEAKER MUTE** LED indicator is NOT illuminated.
5. Verify that the **PHASE** indicator LED is displaying GREEN.
6. Verify that the **SIG** LED indicators on the rear panel are OFF.
7. Set the **REF/dBu** button to +4 dBu; the +4 dBu LED should be illuminated.
8. Set the **A/D SELECT** to Analog; the Analog LED should be illuminated.

Check-Out

The following is done with audio input applied to the channels at the rear panel. The audio input should be a balanced, 0 dBu, 1 kHz continuous tone or burst. The test tone being used should be heard from the speakers, with the **VOLUME** slider set for a comfortable listening level.

1. Verify that the test tone is heard from the speakers. Vary the **VOLUME** slider and verify that the signal goes from full off to full on throughout the slider control range.
2. Insert a stereo 1/4" headphone into the **HEADPHONE** jack and verify that operation is the same for the headphones for volume as it was for the speakers.
3. While monitoring the speakers, press the **SPEAKER MUTE** button to toggle from OFF to MUTE. Verify that the speakers are in fact muted. Return to the OFF position when done.
4. Assure that the **VU/PPM** metering indicator is displaying VU; if not, press the **VU/PPM** button so that the VU indicator LED is illuminated.
5. Set the audio source to +4 dBu and the **REF/dBu** button to +4, and verify for each channel that the Level Meters indicate 0 dB. Toggle the button to +8. The meter reading should drop to -4 dB. Toggle the button back to +4.
6. Press the **VU/PPM** Select button and verify that the PPM LED becomes illuminated. Also verify that the meter reading increases by 6 dB and the meter response is more rapid in the PPM mode.

7. The LED **DIMMER** control comes set for full display brightness when shipped but can be adjusted to suit the monitoring facilities needs so as not to be distracting if a less than fully bright meter display is desired.

Note: *The level meter brightness CANNOT be adjusted to "Full Off." This is to avoid possible operator error and wasted troubleshooting time if turned all the way down.*

8. With both channels having the same audio present, verify that the **PHASE** indicator LED is illuminated GREEN. Remove audio from one channel and verify that the **PHASE** LED turns RED.

Note: *The PHASE LED will always indicate RED when there is a loss of one audio channel.*

9. Reverse the phase of the audio input at one of the XLRs (by reversing the wires connecting to pins 2 and 3) and verify that the **PHASE** indicator LED is illuminated RED. This is a test for mono-compatibility.
10. Insert a true stereo signal at the XLR inputs and verify that the **PHASE** indicator LED is a flickering green to amber color. This is normal for a stereo signal. The amount of RED or GREEN in the **PHASE** LED is an indicator of how much phasor information is present in the monitored stereo signal.
11. With analog audio present at the balanced XLR outputs on the rear panel, verify that the **SIG** indicator LEDs at both input and output are illuminated.
12. *(Steps 12, 13, and 14 are for digitally-equipped units only.)* With digital audio present to the BNC connector(s) **AES1** (and **AES2**), verify that the **SIG** indicator LED(s) associated with the BNC digital inputs are illuminated GREEN on both the front and rear panels.
13. Remove the Digital signals and verify that the LED illuminates RED on both the front and rear panels.
14. Place distinctive audio signals at both the Analog and Digital inputs and then toggle between the Analog and Digital sources via the front panel using the **A/D SELECT** button. Verify that the switching function is in accordance with the source selected. The LED indicator should follow the source selected.
15. With audio still applied to the unit, vary the **DIMMER** control to the preferred brightness level for the LED meter displays.
16. *(For video-equipped units only.)* Insert a video signal through the rear panel BNC video connector and verify that the expected display is present. Adjust front panel screwdriver video controls (**COLOR, TINT, CONTRAST, BRIGHTNESS**) to suit the desired LCD presentation. (Settings are factory preset for optimum viewing and should not normally need further adjustments.)

17. (For non-video units only.) Vary the **BALANCE** control from left to right and verify that the test signal moves from the left speaker to the right speaker (and left headphone channel to right headphone channel), following the slider's motion.

This concludes the basic system check-out of the product, and it is now ready for in-rack placement. Should any of these tests not perform as indicated, please contact the Furman factory for help or service information.

Three Year Limited Warranty

The Furman MS Series Confidence Monitor System is warranted against failures due to defective parts or faulty workmanship for a period of three years after delivery to the original owner. During this period, Furman will make any necessary repairs without charge for parts or labor. Shipping charges to the factory or repair station must be prepaid by the owner. Return shipping charges (via UPS Ground) will be paid by Furman. This warranty applies only to the original owner and is not transferable. Also, it does not apply to repairs done by any company or individual other than the Furman factory or one of its Authorized Repair Stations.

This warranty may be cancelled by Furman at its sole discretion if the unit has been subjected to physical abuse or has been modified in any way without written authorization from Furman. Furman's liability under this warranty is limited to repair or replacement of the defective unit.

Furman will not be responsible for incidental or consequential damages resulting from the use or misuse of its products. Some states do not allow the exclusion of incidental or consequential damages, so the above limitation may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Warranty claims should be accompanied by a copy of the original purchase invoice showing the purchase date; this is not necessary if a Warranty Registration Card was mailed in at the time of purchase.

Service

Before returning any equipment for repair, please be sure that it is adequately packed and cushioned against damage in shipment, and that it is insured. We suggest that you save the original packaging and use it to ship the product for servicing. Also, please enclose a note giving your name, address, phone number, e-mail address (if applicable), and a description of the problem.

All equipment being returned for repair must have a Return Authorization (RA) Number. To get a RA number, please call the Furman Service Department at (707) 763-1010 ext. 40, between 8 a.m. and 5 p.m., U.S. Pacific Time. Please display your RA Number prominently on the front of all packages.

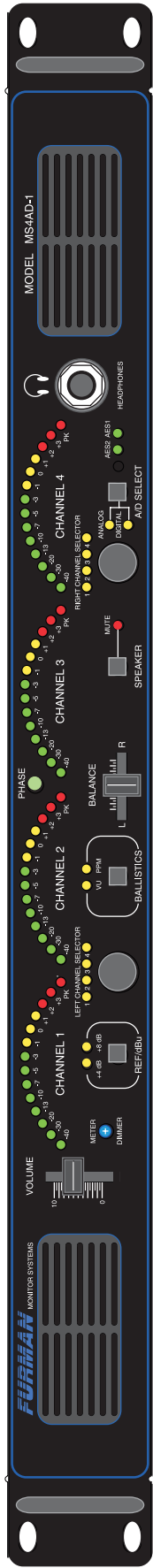


Figure 1 MS4AD-1 Front View

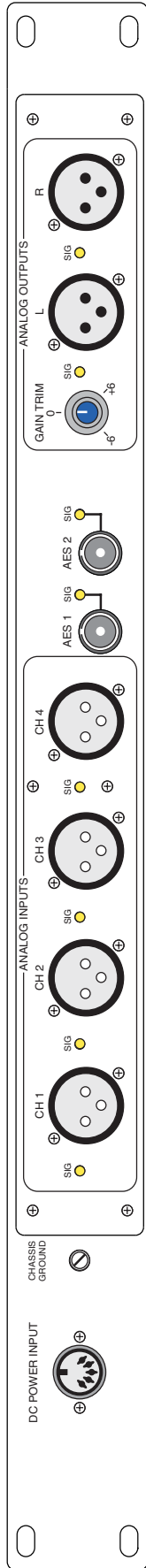


Figure 2 MS4AD-1 Rear View

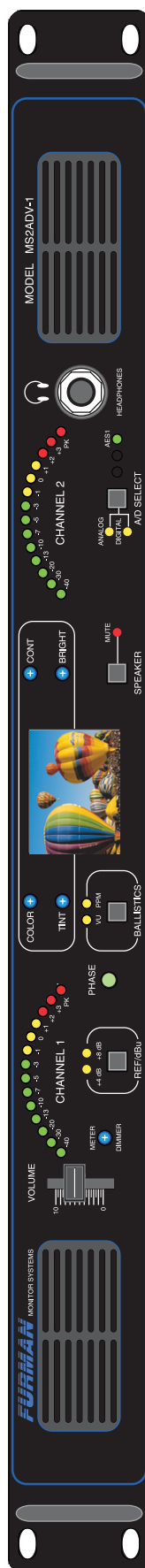


Figure 3 MS2ADV-1 Front View

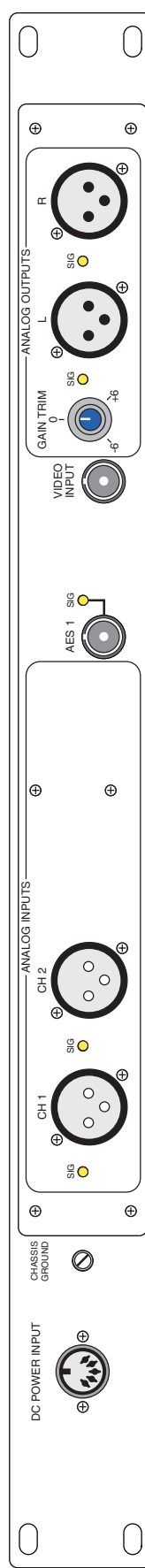


Figure 4 MS2ADV-1 Rear View

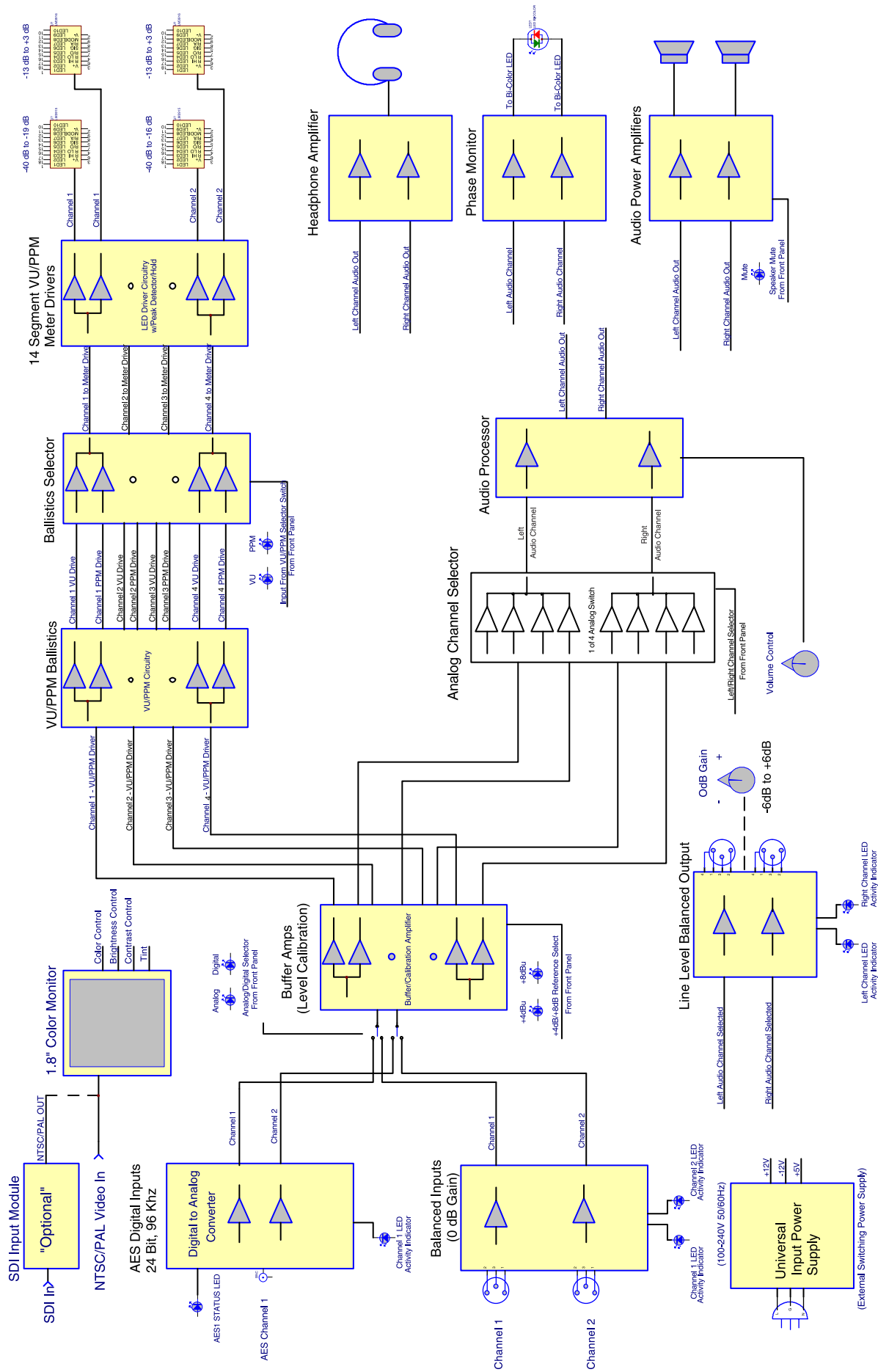


Figure 4 System Flow Chart

MS Series Specifications

Inputs		
Analog audio:	2 (or 4) each female balanced XLR	
	CMRR:	>90 dB, 20 Hz to 20 kHz
	Differential Input Impedance:	24 k Ω
	Maximum Input Level:	+25 dBu
	Signal present indicator:	-20 dBu sensitivity
Digital audio: (if present)	1 (or 2) each BNC, AES/EBU	
	Resolution:	24 bit
	Sampling Frequency:	16 kHz to 96 kHz
	Oversampling:	8X
	Internal Clock:	256 x Sampling Frequency
	THD+N:	-83 dB
	Dynamic Range:	95 dB
	Signal to Noise Ratio:	97 dB
	Channel Separation:	95 dB
	Internal Analog Filter:	-3 dB at 32 kHz
Video: (if present)	1 each BNC Video, auto sense NTSC/PAL	
	Input level:	1.0 V _{p-p} composite video (to EIA RS-170A and PAL Standards)
Outputs		
Analog audio:	2 each male balanced XLR	
	Maximum Output Level:	+25 dBu into 1 k Ω
	Gain Trim:	\pm 6 dB (dual ganged stereo control)
	Signal Present indicator:	-20 dBu sensitivity
	Differential Output Impedance:	50 Ω with load capacitance of up to 1 μ F
	Frequency Response:	20 Hz to 200 kHz
	THD+N:	.002%
Headphone:	Power:	270 mW into 56 Ω , both channels driven
	THD+N:	.003%
Video (if present)		
	Display type:	TFT, LCD
	Screen Size (diagonal):	1.8 inch
	Active Display Area:	48.6 mm W x 39.6 mm H
	Number of pixels:	280 W x 220 H
	Dot Pitch:	0.127 mm W x 0.121 mm H
	Brightness:	140 cd/m ² typical (140 cd/m ² min.)
	Contrast Ratio:	100 typical (60 minimum) at optimized viewing angle
	Viewing Angle:	Left/Right: \pm 45° H (at CR \geq 10) Top/Bottom: \pm 10°/30° V (at CR \geq 10)

Speakers

Type: 2 each, 1.5" x 2.75" full range, acoustically tuned with chassis damping.
Each channel driven by 20 Watt amplifier.
Output: 87 ±6 dB SPL at 1 meter, 150 Hz to 16 kHz
Magnetically shielded

Controls

Front Panel: Volume
Balance (non-video units only)
VU/PPM Select
Speaker Mute
+4/+8 dBu Reference Level Select
Meter Dimmer
Analog/Digital Source Select (digital units only)
Left Channel Select, Right Channel Select (four input models only)

Video Monitor: Brightness, Contrast, Color, Tint
(if present)

Rear Panel: Gain Trim (±6 dB, analog outputs only)

Indicators

Front Panel: 2 (or 4) each, 14 segment LED meters: -40 dB to +3 dB labels; 0 dB indication is equivalent to +4 dBu or +8 dBu depending on Ref Level setting. Internal trim control allows user adjustment. PEAK indicator lights 1 dB above highest display segment, and is internally adjustable.
VU/PPM indicator
Channel to Channel Phase
Analog/Digital input selection
Speaker Mute
Signal Present (for digital inputs only)

Rear Panel: Signal Present for each analog and digital audio input. Sensitivity: -20 dBu

Power

Type: External with IEC-320 connector, 4' (1.2 m) captive cord to DIN 5 connector; separate 8' (2.4 m) AC Mains line cord supplied with connector appropriate for country of use

Operating: Universal 100-240 VAC, 50/60 Hz, 45 W

Agency Approvals: UL/CSA/CE listed

Output: +5 VDC at 3 Amps; +12 VDC at 2 Amps; -12 VDC at .3 Amps

Mechanical

Dimensions: MS Series unit: 19" W x 13" D x 1.75" H; Power Supply: 6.5" W x 3" D x 2.2" H
Weight: 9 lbs (4.1 kg)

Specifications subject to change without notice